

MINUTES OF DOT-AGC BRIDGE DESIGN SUBCOMMITTEE MEETING

The DOT-AGC Joint Bridge Design Subcommittee met on February 13th, 2008. Those in attendance were:

Greg Perfetti	State Bridge Design Engineer (Co-Chairman)
Berry Jenkins	Manager of Highway Heavy Division, Carolinas Branch AGC (Co-Chairman)
Mike Robinson	State Bridge Construction Engineer
Randall Gattis	Sanford Contractors
George White	Blythe Construction
Bryan Long	Dane Construction, Inc.
Erick Frazier	S.T. Wooten Corporation
Chris Britton	Taylor & Murphy Construction Co.
Mark Johnnie	Balfour Beatty Construction
Njoroge Wainaina	State Geotechnical Engineer
Allen Raynor	Asst. State Bridge Design Engineer
Tom Koch	Asst. State Bridge Design Engineer
Paul Lambert	Structure Design Project Engineer
Scott Hidden	Support Services Supervisor – Geotech. Eng. Unit
Chris Kreider	Regional Operations Engineer – Geotech. Eng. Unit
Gichuru Muchane	Structure Design Engineer

During the review of the October 9th, 2007 meeting minutes, the following items were discussed:

1. Continuous Flight Auger (CFA) Piles

Mr. Frazier briefly discussed his experience with drilling CFA piles in water. He did not recommend their use in locations with water noting that the water/spoils mix created a big mess and difficult working conditions.

2. Retaining Wall Surface Finish

Mr. Hidden reported that the Geotechnical Engineering Unit had reviewed the finish requirements on retaining walls, and will be preparing a special provision to amend the Standard Specifications. The special provision will require a Class 2 surface finish for gravity retaining walls and soil nail walls.

The minutes of the October 9th, 2007 meeting were approved.

The following items of new business were discussed:

1. Pile Tonnages

Mr. Wainaina gave a presentation on the impact of the load and resistance factor design (LRFD) method on pile capacities. He provided an overview of the current allowable stress design (ASD) method, which is employed by the Geotechnical Engineering Unit (GEU), and he compared it to the LRFD method, which was mandated by FHWA and implemented by the Department in October 2007.

Mr. Wainaina discussed comparisons of bents designed by the ASD and LRFD methods. He noted that the LRFD method employs a heavier design live load that simulates the force effects of present day vehicular loads. In addition, the LRFD specifications strongly encourage use of Pile Driving Analyzers (PDAs) to verify pile tonnages.

With increased pile loads and additional costs of more PDAs, GEU has been evaluating the cost-benefit of continuing to utilize lower tonnage piles without PDAs versus utilizing longer higher tonnage piles with or without PDAs. The GEU study aimed to optimize the use of higher tonnage piles. Below is a summary of GEU's findings:

- In the mountains and the piedmont where piles are driven to rock, the full structural capacity of the pile can be utilized without requiring PDAs. This will result in using fewer piles per bent and would not necessarily require a larger hammer to drive the piles.
- In the mountains and the piedmont where piles are not driven to rock, the controlling factor for pile capacities is the pile driving stress, which promotes use of PDAs to achieve higher pile tonnages. The number of piles per bent can be reduced by up to 40%.
- In the coastal plain, the controlling factor for pile capacities is the pile driving stress, which promotes use of PDAs to achieve higher pile tonnages with longer piles. The higher tonnage piles will reduce the number of piles per bent, and will probably require a larger hammer to drive the piles.
- In the coastal plain, considerable savings could be realized by using higher tonnage piles on bridges with 3 or more spans, even with the additional cost of PDAs. For smaller bridges, it is more cost-effective to omit the PDAs and utilize lower tonnage piles.

Contractors were concerned by the need for larger hammers in the coastal region. However, GEU noted that a typical D-19 hammer should have sufficient energy to drive piles up to 240 tons.

There was some discussion on separating payment for pile driving into payment for supplying the piles and payment for driving the piles.

Contractors were also concerned about delays in receiving PDA results and the pile driving criteria. GEU noted that the consultant hired by the Contractor establishes the pile driving criteria. GEU will also work with the Resident Engineers to ensure there is timely communication of the PDA results.

2. Standardized Cored Slab Bridge Plans

Mr. Raynor stated that the Department is exploring ways to improve project delivery times in order to meet the State's current and future transportation needs. As such, the Department will consider lumping similar small projects within the same geographical area and let them together. He added that the plans for these projects will reflect the "look and feel" of Purchase Order Contracts (POC), with limited approach roadway work. In addition, for smaller bridges the Department is developing standardized cored slab bridge plans for design consistency.

3. 2007 Design Manual – Use of Cored Slabs

Mr. Gattis noted that the 2007 Structure Design Manual disallows use of cored slabs on bridges with 4 or more spans. He questioned the intent of the statements.

Mr. Perfetti responded that the intent is to minimize substructure units and revert to girder superstructures for longer bridges. He also noted that the Department selects the appropriate bridge superstructure type by considering the bridge functional classification and life-cycle cost. He briefly discussed the State's current and future transportation needs, which will require a significant increase in annual bridge lettings. Mr. Perfetti noted that many of the replacement bridges will utilize cored slab units.

4. *Uniformity for Lettings*

Mr. Gattis stated that the offices that let bridges (Central, Divisions & BMU) do not have uniform bidding requirements for all bridge projects. The discussion noted that the Transformation Management Team recommends that the Bridge Management Unit no longer let POCs.

Regardless of the delivery method, Contractors reiterated preference for centrally let contracts.

5. *Shaft Inspection Device (SID) for Drilled Shafts*

Mr. Robinson discussed problems with scheduling shaft inspections. Most of the problems arise when the drilled shaft subcontractors estimate the date and time the shafts will be available for inspection, but fail to meet the schedule. As a result, there have been problems with scheduling inspection devices and the inspectors who operate the equipment.

Mr. Robinson stated that the Department may have to consider including penalties in the contract, but preferred to resolve the problem through better communication. He appealed to Contractors to take an active role in encouraging their subcontractors to improve communication; for example, they could confirm the requested inspection a few days in advance.

6. *Stone Backfill Quantities for MSE Walls*

Mr. White stated that Contractors often find significant discrepancies between the bid estimate and the required quantities of stone backfill for MSE walls. He inquired if the Department has any idea of the backfill quantities going into the bids. The Geotechnical Unit stated that the Department generally does not design MSE walls. They added that MSE walls are proprietary systems and the backfill quantities could be influenced by the MSE wall type (and associated design methodology) selected by the wall designer.

7. *Other*

i. PDA Special Provision - Restrikes:

Mr. Britton stated that the section on Redriving Piles in the Special Provision for Pile Driving Analyzer (PDA) was ambiguous regarding payment for pile restrikes with a PDA. The Geotechnical Engineering Unit provided clarification on the intent of the special provision stated that they would attempt to clarify the verbiage in the provision.

ii. Loads on Bridge Decks:

Mr. Johnnie stated the 7 days for curing the deck concrete required in Section 420-20 of the Standard Specifications was too restrictive when contractors need to move the screed across the deck to prepare for the next deck pour. He offered to share calculations that show that the deck would not be overstressed by transient screed loads prior to the 7 day cure period.

iii. Class AA Concrete with 3½" Slump:

Mr. Gattis stated that it was difficult to come up with a 3½" slump Class AA concrete mix design that is sufficiently workable. He requested the Department increase the allowable slump to 4-4½", while maintaining the Class AA water-cement ratio.

Mr. Gattis was advised to bring up the matter with the Materials and Tests Unit.

8. *Next Meeting*

The next meeting is scheduled for Wednesday, April 16th, 2008 in Structure Design Conference Room C.